

Appl. No. 09/834,413  
Response Dated 12/02/2005  
Reply to Office communication of 09/06/2005

### REMARKS/ARGUMENTS

#### Specification amendments

The specification has been amended to provide the patent numbers for the US Patents issued from, and otherwise provide the current status of, the patent applications cited in the specification; and to correct typographical errors. No new matter has been added through the amendments to the specification. Approval of the specification amendments is requested.

#### Claims

Claims 1-50 are pending in the application. Claims 43-46 and 48-50 are allowed. Claims 1-19, 23-42 and 47 are rejected on prior art grounds; and claim 36 is further rejected on 35 U.S.C. 112 grounds. Claims 20-22 are objected to as being dependent on a rejected base claim, but would be allowable if written in independent form to include all of the limitations of the claims from which they depend. Applicants have amended claims 1, 25, 30, 36, 38 and 47 in order to overcome the rejections. Applicants have amended claims 21 and 22 to provide proper antecedent basis. Applicants have amended allowed claim 43 to provide proper antecedent basis, and claim 48 to correct a typographical error. Please enter amended claims 1, 21, 22, 25, 30, 36, 38, 43, 47 and 48. Applicants have canceled claims 20, 31, 39 and 40.

#### 35 USC § 112 Rejections

##### Claim 36

The Examiner has rejected claim 36 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicants regard as the invention. In claim 36, line 1, there is no antecedent basis for "said library." The applicants have amended claim 36 so that it now depends

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from claim 35 (instead of claim 22), thus providing the necessary antecedent basis for "said library."

In view of these claim amendments, the applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. 112, second paragraph, of claim 36.

**35 USC § 102 Rejections**

Claims 1-15, 23, 24, 30-32, 35-37 and 47

Claims 1-15, 23, 24, 30-32, 35-37 and 47 are rejected under 35 U.S.C. 102(b) as being anticipated by Duret et al. (US 4,663,720).

Regarding independent claim 1, the applicants have amended this claim by incorporating elements of claim 20, which was objected to, but would be allowable if rewritten in independent form to include all of the limitations of the claims from which it depends. The amended independent claim 1 reads:

Claim 1. (currently amended) A system for creating an individual, three-dimensional virtual tooth model representing a tooth found in a dentition assigned to a patient, comprising:

a memory storing at least one virtual three-dimensional model of a template object corresponding to a tooth, including a template tooth corresponding to said tooth;

a data processing system including a memory storing a virtual three-dimensional model of at least a part of the dentition;

wherein said data processing system further comprises software processing said virtual three-dimensional model of at least a part of the dentition and said virtual model of the template object and responsively deriving said individual, three-dimensional, virtual tooth model;

wherein said software comprises:

1. a routine superimposing said virtual template object corresponding to a tooth on said virtual model of at least a part of the dentition;

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2. a routine drawing vectors from said virtual template object to a surface of said virtual model of the dentition and storing a set of points where said vectors intersect said surface;
3. a routine forming a new surface comprised of said set of points; and
4. a routine filling missing parts of said surface, if any, from said template tooth.

In view of the amendment of claim 1, it no longer is anticipated by Duret; and the applicants respectfully request that the rejection under 35 U.S.C. 102(b) of claim 1 should be withdrawn.

Regarding claims 2-15, 23 and 24, each of these claims depends, directly or through an intervening claim, from independent claim 1. In view of the amendment to claim 1, and the remarks presented above in support of withdrawal of the anticipation rejection under 35 U.S.C. 102(b) of claim 1, the applicants respectfully submit that the Examiner's grounds for the anticipation rejection of claims 2-15, 23 and 24 under 35 U.S.C. 102(b) are moot and request that the anticipation rejection of claims 2-15, 23 and 24 under 35 U.S.C. 102(b) should be withdrawn.

Regarding independent claim 30, the applicants have amended this claim in a manner analogous to claim 1 by incorporating the essence of the elements of claim 20. The amended independent claim 30 reads:

Claim 30. (currently amended) An orthodontic workstation, comprising:  
a memory comprising data storage regions storing a data representing virtual three-dimensional anatomical structures including an individual, three-dimensional virtual tooth model representing an individual tooth of a patient isolated from surrounding anatomical structures;  
a user interface including a display for displaying said individual virtual tooth model;  
interactive software for allowing a user to manipulate said virtual tooth model with respect to said surrounding anatomical structures ;  
wherein said individual virtual tooth model is generated from a scan of the dentition of a patient and a virtual three-dimensional template tooth using software comprising:  
1. a routine superimposing said virtual template tooth on said scan of the dentition;

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2. a routine drawing vectors from said virtual template tooth to a surface of said scan of the dentition and storing a set of points where said vectors intersect said surface;
3. a routine forming a new surface comprised of said set of points; and
4. a routine filling missing parts of said surface, if any, from said template tooth.

In view of the amendment of claim 30, it no longer is anticipated by Duret; and the applicants respectfully request that the rejection under 35 U.S.C. 102(b) of claim 30 should be withdrawn.

Regarding claims 31-32 and 35-37, the applicants have canceled claim 31, and each of the remaining claims depends, directly or through an intervening claim, from independent claim 30. In view of the amendment to claim 30, and the remarks presented above in support of withdrawal of the anticipation rejection under 35 U.S.C. 102(b) of claim 30, the applicants respectfully submit that the Examiner's grounds for the anticipation rejection of claims 32 and 35-37 under 35 U.S.C. 102(b) are moot and request that the anticipation rejection of claims 32 and 35-37 under 35 U.S.C. 102(b) should be withdrawn.

Regarding independent claim 47, the applicants have amended this claim in a manner analogous to claim 1 by incorporating the essence of the elements of claim 20, and further by incorporating elements of claims 21 and 22. The amended independent claim 47 reads:

Claim 47. (currently amended) In a method for making a crown for a tooth in which a crown is manufactured to fit to a prepared tooth, the improvement comprising:

scanning said prepared tooth thereby creating a scanned virtual model of said prepared tooth and responsively creating a finished virtual model of said prepared tooth from said scanned virtual model;

storing in memory a virtual template crown for said tooth; and

providing a user interface and software wherein said software displays said virtual crown object and said finished virtual model of said prepared tooth and permits a user to adapt said virtual crown object to said finished virtual model of said prepared tooth;

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wherein said step of responsively creating said finished virtual model of said prepared tooth further comprises the steps of:

1. superimposing a virtual template tooth corresponding to said prepared tooth on said scanned virtual model;
2. drawing vectors from said virtual template tooth to a surface of said scanned virtual model and storing a set of points where said vectors intersect said surface;
3. forming a new surface comprised of said set of points;
4. filling missing parts of said surface, if any, from said template tooth; and
5. performing an iterative execution of steps 1., 2., 3., and 4., with the surface after execution of step 3. or step 4. replacing the scanned virtual model at step 1. in successive iterations; wherein when said iterative execution of steps 1., 2., 3., and 4. terminates, the surface generated after the final iteration is displayed for the user as said finished virtual model.

In view of the amendment of claim 47, it no longer is anticipated by Duret; and the applicants respectfully request that the rejection under 35 U.S.C. 102(b) of claim 47 should be withdrawn.

#### Claims 25-42

Claims 25-42 are rejected under 35 U.S.C. 102(b) as being anticipated by Doyle et al. (US 5,879,158).

Regarding independent claim 25, the applicants have amended this claim in a manner analogous to claim 1 by incorporating the essence of the elements of claim 20.

The amended independent claim 25 reads:

Claim 25. (currently amended) An orthodontic workstation, comprising:  
a memory storing virtual three dimensional template teeth and a virtual three-dimensional model of the dentition of a patient;

a data processing system comprising software operating on said virtual template teeth and said virtual model of the dentition and responsively creating a set of individual, virtual, three-dimensional tooth models representing the teeth of the patient and storing said individual, virtual, three-dimensional tooth models in said memory ;

wherein said software comprises:

1. a routine superimposing a virtual tooth template corresponding to a tooth on said virtual model of the dentition; wherein said virtual tooth template is obtained from said virtual template teeth;

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2. a routine drawing vectors from said virtual tooth template to a surface of said tooth on said virtual model of the dentition and storing a set of points where said vectors intersect said surface;
3. a routine forming a new surface comprised of said set of points; and
4. a routine filling missing parts of said surface, if any, from said tooth template.

In view of the amendment of claim 25, it no longer is anticipated by Doyle; and the applicants respectfully request that the rejection under 35 U.S.C. 102(b) of claim 25 should be withdrawn.

Regarding claims 26-29, each of these claims depends directly from independent claim 25. In view of the amendment to claim 25, and the remarks presented above in support of withdrawal of the anticipation rejection under 35 U.S.C. 102(b) of claim 25, the applicants respectfully submit that the Examiner's grounds for the anticipation rejection of claims 26-29 under 35 U.S.C. 102(b) are moot and request that the anticipation rejection of claims 26-29 under 35 U.S.C. 102(b) should be withdrawn.

Regarding independent claim 30, as noted earlier the applicants have amended this claim in a manner analogous to claim 1 by incorporating the essence of the elements of claim 20.

In view of the amendment of claim 30, it no longer is anticipated by Doyle; and the applicants respectfully request that the rejection under 35 U.S.C. 102(b) of claim 30 should be withdrawn.

Regarding claims 31-37, the applicants have canceled claim 31, and each of the remaining claims depends, directly or through an intervening claim, from independent claim 30. In view of the amendment to claim 30, and the remarks presented above in support of withdrawal of the anticipation rejection under 35 U.S.C. 102(b) of claim 30, the applicants respectfully submit that the Examiner's grounds for the anticipation rejection of claims 32-37 under 35 U.S.C. 102(b) are moot and request that the anticipation rejection of claims 32-37 under 35 U.S.C. 102(b) should be withdrawn.

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Regarding independent claim 38, the applicants have amended this claim in a manner analogous to claim 1 by incorporating the essence of the elements of claim 20; and further by incorporating elements of claims 39 and 40. The amended independent claim 38 reads:

Claim 38. (currently amended) An orthodontic workstation, comprising:  
a memory storing a library of virtual orthodontic objects, said objects comprising virtual, three-dimensional orthodontic brackets;  
a user interface; and  
a processing system including software for displaying said orthodontic brackets on said user interface and providing a navigational tool for enabling a user of said workstation to independently move said virtual orthodontic brackets in three dimensions;  
wherein said objects further comprise individual, virtual three-dimensional tooth objects and wherein said software enables said orthodontic brackets to be placed on said tooth objects;  
wherein said objects further comprise virtual three-dimensional template teeth;  
wherein said individual, virtual three-dimensional tooth objects are generated from a scan of the dentition of a patient and virtual three-dimensional template teeth using software comprising:  
1. a routine superimposing said virtual template teeth on said scan of the dentition;  
2. a routine drawing vectors from said virtual template teeth to a surface of said scan of the dentition and storing a set of points where said vectors intersect said surface;  
3. a routine forming a new surface comprised of said set of points; and  
4. a routine filling missing parts of said surface, if any, from said template teeth.

In view of the amendment of claim 38, it no longer is anticipated by Doyle; and the applicants respectfully request that the rejection under 35 U.S.C. 102(b) of claim 38 should be withdrawn.

Regarding claims 39-42, the applicants have canceled claims 39 and 40, and each of the remaining claims depends directly from independent claim 38. In view of the amendment to claim 38, and the remarks presented above in support of withdrawal of the anticipation rejection under 35 U.S.C. 102(b) of claim 38, the applicants respectfully submit that the Examiner's grounds for the anticipation rejection of claims 41-42 under

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35 U.S.C. 102(b) are moot and request that the anticipation rejection of claims 41-42 under 35 U.S.C. 102(b) should be withdrawn.

**35 USC § 103 Rejections**

**Claims 16-19**

The Examiner has rejected claims 16-19 under 35 U.S.C. 103(a) as being unpatentable over Duret et al. (US 4,663,720).

Regarding claims 16-19, each of these claims depends, directly or through one or more intervening claims, from independent claim 1. In view of the amendment to claim 1, and the remarks presented above in support of withdrawal of the anticipation rejection under 35 U.S.C. 102(b) of claim 1, the applicants respectfully submit that the Examiner's grounds for the unpatentability rejection of claims 16-19 under 35 U.S.C. 103(a) are moot and request that the unpatentability rejection of claims 16-19 under 35 U.S.C. 103(a) should be withdrawn.

**Allowed Claims**

**Claims 43-46 and 48-50**

The examiner has allowed claims 43-46 and 48-50.

Regarding independent claim 43, the applicants have amended this claim by replacing in line 13 "said portions" with - the portion - to provide proper antecedent basis.

Regarding independent claim 48, the applicants have amended this claim by replacing in line 10 "said" with - aid - to correct the typographical error.

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**Objected Claims**

**Claims 20-22**

Claims 20-22 are objected to as being dependent on a rejected base claim, but would be allowable if written in independent form to include all of the limitations of the claims from which they depend.

Regarding claim 20, applicants have elected to amend independent claim 1 with elements of claim 20; and canceled claim 20.

Regarding claims 21 and 22, these claims are pending in the application and have been amended to provide proper antecedent basis.

Favorable consideration of the amendment and allowance of all pending claims is requested.

Respectfully submitted.

Date: 2 Dec. 2005

By:

Jasvantrai C. Shah

Jasvantrai C. Shah  
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**CERTIFICATE OF TRANSMISSION UNDER 37 CFR § 1.8**

The undersigned hereby certifies that the foregoing Amendment is being transmitted by facsimile to number (571) 273-8300 addressed to: Commissioner for Patents, Attn. Examiner Ralph A. Lewis, on this 2<sup>nd</sup> day of December 2005.

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